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Claims

[c1] 1. A physical vapor deposition apparatus, comprising:
a reaction chamber; and
an electromagnet magnetron device, disposed above and outside said reaction chamber, wherein when performing a physical vapor deposition process, magnetic poles of said electromagnet magnetron device are reversed in-situ.

[c2] 2.The apparatus of claim 1, wherein said electromagnet magnetron device includes a plurality of magnets.

[c3] 3.The apparatus of claim 1, wherein said reaction chamber includes:
a chamber;
a target backboard, at the top of said chamber; and
a plate, disposed at the bottom of said reaction chamber.

[c4] 4. A physical vapor deposition process, comprising:
providing a chamber and an electromagnet magnetron device disposed above and outside said reaction chamber;
starting said electromagnet magnetron device to perform

a first deposition process; and
reversing magnet poles of said electromagnet magnetron device to perform a second deposition process to deposit a thin film.

[c5] 5.The process of claim 4, wherein said first deposition process and said second deposition process are implemented in one deposition cycle, and said thin film is formed by more than one of said deposition cycle.

[c6] 6.The process of claim 4, further comprising a step of changing a magnitude of a current to adjust a magnetic field strength of said electromagnet magnetron device to reduce a shift of said thin film based on a target life of said physical vapor deposition process.

[c7] 7. The process of claim 4, wherein said electromagnet magnetron device includes a plurality of magnets.

[c8] 8.A physical vapor deposition apparatus, comprising:
a reaction chamber; and
a rotating magnetron, device disposed above and outside said reaction chamber, said rotating magnetron device including at least two magnet sets, said magnet sets being axially-symmetric or planarly-symmetric to each other and magnetic pole of said magnet sets being disposed opposite to each other.

[c9] 9.The apparatus of claim 8, wherein said reaction chamber includes:
a chamber;
a target backboard, at the top of said chamber; and
a plate disposed at the bottom of said reaction chamber.

[c10] 10. The apparatus of claim 9, wherein an axis of said axially-symmetrically disposed magnet sets or a plane of said planarly-symmetrically disposed magnet sets passes through a central axis of said target backboard, and when performing a physical vapor deposition process, said rotating magnetron device rotates along said central axis.

[c11] 11. The apparatus of claim 8, wherein one of said two magnet sets includes a first magnet and a second magnet; the other of said two magnet sets includes a third magnet and a fourth magnet; said first magnet and said third magnet are disposedaxially-symmetrical to each other; said second magnet and said fourth magnet are disposedaxially-symmetrical to each other; a first magnetic pole of said first magnet and said fourth magnet and a first magnetic pole of said second magnet and said third magnet are disposed opposite each other.

[c12] 12.The apparatus of claim 8, wherein one of said two

magnet sets includes a first magnet and a second magnet; the other of said two magnet sets includes a third magnet and a fourth magnet; said first magnet and said third magnet are disposed planarly-symmetrical to each other; said second magnet and said fourth magnet are disposed planarly-symmetrical to each other; a first magnetic pole of said first magnet and said fourth magnet, and a first magnetic pole of said second magnet and said third magnet are disposed opposite to each other.

[c13] 13. A physical vapor deposition process, comprising:
providing a chamber and a rotating magnetron device disposed above and outside said reaction chamber, said rotating magnetron device including at least two magnet sets, said magnet sets being disposed axially-symmetrical or planarly-symmetrical and magnetic pole of said magnet sets being disposed opposite; and
starting said rotating magnetron device to perform a deposition process, and rotating said rotating magnetron device during said deposition process.

[c14] 14.The process of claim 13, wherein said magnet sets are disposed axially-symmetrical, and said rotating magnetron device rotates by 180n degrees during said deposition process, wherein said n is a positive integer.

[c15] 15.The process of claim 13, wherein said magnet sets

are disposed axially-symmetrical, and said rotating magnetron device rotates by 360n degrees during said deposition process, wherein said n is a positive integer.